Food addiction and the outcome of bariatric surgery at 1-year: Prospective observational study

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ABSTRACT

Purposes: The objectives of the current study were to determine the prevalence of food addiction in bariatric surgery candidates and whether food addiction is associated with weight loss after bariatric surgery.
Methods: This prospective observational study was performed on morbidly obese patients who had been found suitable for bariatric surgery. Follow-up was conducted at the 6 and 12 month post-surgery. The Yale Food Addiction Scale (YFAS) was used to determine food addiction.
Results: One hundred seventy-eight patients were included. Pre-operative food addiction was found in 57.8% of patients. Food addiction prevalence decreased at the 6 and 12 month follow ups, to 7.2% and 13.7% respectively. There were no statistically differences between those with food addiction and those without addiction with regard to weight loss measured as percent of excess BMI at the 12 month follow-up.
Conclusion: Food addiction as measured by the YFAS decreases significantly after bariatric surgery. The presence of food addiction before surgery was not associated with weight loss as measured EBL%. However, in view of the increase in BMI, 2 years after surgery longer follow up studies are warranted.

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1. Introduction

The number of patients seeking treatment for obesity has been rising, as has the prevalence of obesity (Buchwald and Oien, 2009; Ng et al., 2014). Bariatric surgery has been gaining in popularity, given that other methods of weight loss for severe obesity such as dieting, exercise, behavioral treatment, and pharmacotherapy, have generally failed to be effective long-term treatments. Bariatric surgery appeals to many patients because it usually provides a rapid and dramatic change in weight that can be perceived shortly after the surgery (Colquitt et al., 2014). In addition comorbid conditions, including hypertension and dyslipidemias, as well as psychosocial functioning and quality of life generally improve as well (Colquitt et al., 2014). But in some of cases, these surgical procedures fail in terms of weight loss, and some patients even if initially successful regain considerable weight. Therefore it is important to identify factors associated with negative outcome to reduce the failure rate of bariatric surgery regarding the weight loss. Although a subset of patients seems to regain weight very distal to bariatric surgery,

increased risk for weight regain generally occurs in the 2–3 years following surgery (Sjöström et al., 2004).

Research shows that bariatric surgery candidates have higher rates of several types of psychopathology compared to other obese individuals and to people in the general population (Malik et al.,2004). There has also been an increasing interest in recent years concerning the possible role of what is refereed to as "food addiction" in the etiology of obesity and its predictive role in the outcome of obesity treatments (Madan et al., 2006; Lent et al., 2014). There is literature supporting this conceptualization and studies suggesting an increase in this problem in recent years (Lent et al., 2014).

Food addiction is conceptualized as a behavioral pattern that is similar in some ways to addictions to alcohol and other substances. These behaviors are generally characterized by the high consumption of sugary, salty, fatty and processed foods (Gearhardt et al., 2009a). The so-called food addiction criteria were modelled after the DSM-IV substance addiction criteria. Research that has compared the criteria for alcohol and substance addiction and the criteria for food addiction has concluded that many of the criteria overlap (Meule et al., 2012). Current literature suggests that the substance seeking behavior observed in substance dependency share similar phenotypic aspects with food seeking behavior seen in obese individuals; both are also similar regarding their underlying neurocircuitry (Smith and Robbins, 2013). It has been

suggested in the literature that "food addiction" is a misnomer, because of the ambiguous connotation of a substance-related phenomenon. Current evidence in humans suggests that "eating addiction" rather than "food addiction" may more precisely define addictive-like food intake (Hebebrand et al., 2014).

In order to evaluate food addiction, the Yale Food Addiction Scale (YFAS) was developed by Gearhardt and colleagues. The estimated prevalence of food addiction ranges from 5.4% in general population to 11% in predominantly normal weight undergraduates to 15.2–19.6% in obese treatment-seeking adults, to 42% in bariatric surgery candidates, and to 57% in obese adults with binge eating disorders (Meule et al., 2012; Gearhardt et al., 2009b; Burmeister et al., 2013; Eichen et al., 2013; Pursey et al., 2014; Pedram et al., 2013). However, few studies have examined the prevalence of food addiction in bariatric surgery seeking populations, and little known about the effect of food addiction on weight loss after bariatric surgery. Meule et al. found using the YFAS a prevalence of food addiction in 42% of bariatric surgery candidates (Meule et al., 2012). Pepino et al. identified food addiction in 14 of 44 subjects (32%) before surgery (Pepino et al., 2014). In another study, Ardelt-Gattinger et al. found that there were positive changes in addictive symptoms, as measured by The Obesity Diagnostics and Evaluation System (AD-EVA) test, after gastric bypass surgery (Ardelt-Gattinger et al., 2012), while it has also been shown that bariatric surgery reduces food addiction symptoms in these patients (Pepino et al., 2014).

The purpose of this longitudinal study was to determine the prevalence of food addiction before and after bariatric surgery, and to test the hypotheses that weight loss induced by bariatric surgery induces remission of food addiction as measured by the YFAS. We also aimed to determine the effects of the existence of pre-surgical food addiction on weight loss after the surgery.

2. Materials and methods

2.1. Study population

This study was conducted using 178 consecutive patients who had been found suitable for bariatric surgery at the Bezmialem Vakıf University, Medical Faculty, Department of Bariatric and Metabolic Surgery, between 2011 and 2013. Patients were selected according to following criteria for the surgery: (1) patients with BMI > 40 kg/m^2 and patients with BMI > 35 kg/m^2 but less than < 40 kg/m^2 who had medical comorbidity from their obesity and; (2) patients should be > 18 years old. The Ethical Review Board of the Medical Faculty, Bezmialem Vakif University, approved the study. Informed consent was obtained from all participants prior to study participation. Of those available, 166 participants completed a YFAS prior to surgery. Eligible participants also completed the YFAS at 6-month and 12-month after the surgery. We obtained BMI data from bariatric surgery outpatient setting and also from dietetics department for each patient. YFAS was used only for those who came to bariatric surgery outpatient clinics for their follow-up (6-month n:83; 12-month n:51) or to the dietetics outpatient. (6-month n:158; 12-month n:94).

2.2. Surgical techniques

In this study the surgeries performed included laparoscopic sleeve gastrectomy (n=136, 81.9%) and omega loop gastric bypass (n=30, 18.1%). This decision as to the type of surgery was based on the discussion between the patient and surgeon considering the advantages and disadvantages of each procedure. The expected weight-loss, the reliability of weight lost, the expected rapidity of the surgery effect, the reversibility, the resultant loose skin

problem and the cost of the procedure.

2.3. Measurements

2.3.1. Yale food addiction scale

Yale Food Addiction Scale was developed by Gearhardt and colleagues (Gearhardt et al., 2009b). (Available at the internet: http://dx.doi.org/10.13072/midss.285) A single factor solution for the YFAS has been shown among university students and obese samples (Gearhardt et al., 2009a). The internal consistency for the scale was found to be $\alpha = 0.86$ for the English language version. It has also been shown that YFAS is a reliable and valid scale both for bariatric surgery patients, and non-clinical obese samples (Davis et al., 2011; Meule and Kübler, 2012). The Turkish language adaptation of the YFAS has been found to be reliable and valid, as shown by Bayraktar et al. (Bayraktar et al., 2012). The validity and reliability of the Turkish YFAS among bariatric surgery patients was performed by Sevinçer et al. as a part of this study. Internal consistency was found to be 0.822, as analyzed by the Kuder Richardson 20 formula (Sevinçer et al., 2015).

This 25-item instrument contains different scoring options (dichotomous and frequency scoring) indicating addictive eating behavior over the past 12-month. The scores can be generating by summing up the questions under each substance dependence criterion (e.g. Tolerance, Withdrawal, Clinical Significance). If the score for the criterion is > 1, then the criterion has been met and is scored as 1. If the score $= 0$, then the criteria has not been met. To score the continuous version of the scale, one totals all of the scores for each of the criterion (e.g. Tolerance, Withdrawal, Use Despite Negative Consequence). Food addiction is diagnosed when three (or more) symptoms and clinically significant impairment or distress are present. Three items are not scored, but are primers for other questions (Gearhardt et al., 2009b).

2.3.2. Percent of excess BMI lost (%EBL)

One of the most widely used methods for comparing various obesity treatments is percent of excess BMI lost (%EBL) (Dixon et al., 2005). We decided to calculat%EBL as an outcome measurement of weight, using the following formula (Deitel and Greenstein, 2003).

$$EBL = \frac{Preoperative\ BMI - Current\ BMI\downarrow\%}{\times 100\downarrow Preoperative\ BMI - 25}.$$

2.4. Statistical analysis

The YFAS scores were normally distributed, with mean $\pm$ SD reported. We analyzed group differences with independent samples T test. Raw correlation coefficients were calculated with the Pearson method. Linear regression analysis was used with forward modeling to find independent predictors of actual values of normally distributed continuous variables, preoperative YFAS scores, and the EBL% scores at 1 year. We found that the number of observation was enough and power of the study was 100%. All statistics were calculated with software statistical packaging program, SPSS for Windows version 21.0 (SPSS Inc., Chicago, IL, USA).

3. Results

166 participants (38 male, 22.9%, 128 female; 77.1%) were included in the analysis. The mean age was 35.6 ± 9.8 with a range from 18 to 61. The patients mean pre-surgical BMI was 47.0 ± 7.1